

# CLEAPSS BULLETIN 130

For all technicians and teachers of science and design & technology

Autumn term 2007



Supporting practical science & technology  
- in schools & colleges

## Circulation list: Science and D & T


## Welcome! ...

We are pleased to announce that we have appointed Jane Nickless to our newly-created position of Senior Technician, to keep us organised in our laboratory and help prepare for courses. She will also carry out various research projects and assist with some IT work. Jane joins us in October from Wycombe Abbey School and it won't be long before we wonder how we ever coped without someone in this post! Barbara Elliott has also joined us to work in the office during the afternoon, so those ringing our **Helpline** after lunch will hear a new voice.

## They're here!

At last, the brand new edition of *Hazcards* has arrived and it's very much bigger than before! We have maintained the same numbering system as on the old edition but this has meant that there are several A, B & C cards because the masses of new risk assessments and additional chemicals included just could not be squeezed onto a single card. Also, to make room for additional material, we have removed the largely-repetitive information on emergency procedures from individual cards and created a separate 'E' card. Where there is additional emergency information specific to particular chemicals, this is given on individual cards.

We have also produced a separate 'W' card which offers general guidance on waste disposal. Codes from W1-W8 are given for each chemical or 'Wspec' gives disposal instructions specific to a substance. Risk numbers and phrases are now given for each chemical and separate 'R' cards conveniently list these together. Workplace Exposure Limit (WEL) values are also given, where appropriate, for substances for which exposure to airborne particles or fumes must be carefully controlled. Hazard classifications of some chemicals have changed; of particular note is hydrogen peroxide, which is now classed as HARMFUL or IRRITANT. Use of the *Index cards* is absolutely **essential** in order to find information on specific chemicals; it has often been necessary to move some substances to a new *Hazcard*. The *Index cards* include both the names of chemicals and the activities using the chemicals.

On the reverse of the cards, there are many new model risk assessments. Control measures have been separated out from the experimental points in order to make it easier to identify essential safety precautions. More detail is also given, for example, with instructions on specific types of eye protection or gloves to wear.

**Please destroy all existing copies of any previous edition;** if you continue to use old *Hazcards*, you will be using out-of-date hazard and waste-disposal information!

## A new CLEAPSS course

We have created a new technicians' course: *Running a Prep Room*. This one-day, discussion-based course will explore and share ideas for good prep-room management. It is aimed at senior technicians, and those aspiring to become senior technicians, and is based on the CLEAPSS guides L248 a & b, *Running a Prep Room*. We welcome requests for this course to be held around the UK.

## ... and it's goodbye to him!

John Tranter has been at CLEAPSS for 17 years. Many of you will know him either through attending one of his courses or by talking to him on the **Helpline**. You will know of his vast experience and expertise in biology/microbiology. Most of you will not know that John has also been the editor of all our publications, including the *Bulletin*. John is retiring at the end of this term. As he has recently qualified for a free bus pass, he has decided that it's time to stop coming to work every day and to embark on other activities.

BC (Before CLEAPSS), John taught in central London, and then worked at the North London Science Centre and the Centre for Life Studies (based at London Zoo); both institutions, sadly, no longer exist. He has also long been involved in examining biology at O level, GCSE and A level. He has been a chief examiner for various biology courses including Nuffield A-level biology. At the heart of all of this is a passion for practical biology teaching and for encouraging this in others.

John came to CLEAPSS with a track record of advising teachers on how to make the best use of plants and animals in their science teaching. He had already written a range of articles and booklets and carried out a great deal of training. All of this was of huge benefit to us and, throughout his time here, John has continued in the same fashion. The biology and microbiology parts of the *Handbook* and the CLEAPSS guides on using animals and plants in both primary and secondary teaching owe their existence to John's enthusiasm and knowledge, and also to contributions from his network of like-minded individuals.

John is also a lover of music, the theatre and good food & wine. For many years, he has arranged our Christmas lunch competition to 'guess the grape'. Although many of us are pathetically unsuccessful at this, we have hugely enjoyed the challenge. On such days, as a consequence, some last-minute callers may have noticed more relaxed responses to **Helpline** queries.

It is a cliché, but so clearly true, to say that John will be missed. His departure will leave a gap which we are doing our best to fill, but we will never be completely successful. I wish to record here my personal thanks to John and all our best wishes for life AC.

*Phil Bunyan*, Director

## Did the earth move for you?

Schools in Dudley and Kent at least should be interested in the UK School Seismology Project, organised by the British Geological Survey. This project will make use of earthquakes and seismology to provide simple classroom activities (in collaboration with the Science Enhancement Programme) and enable schools to operate their own seismic recording station to monitor signals from large quakes around the world. Inexpensive items of equipment to support the activities will be marketed by Middlesex University Teaching Resources ([www.mutr.co.uk](http://www.mutr.co.uk)). A web site will provide access to teaching resources and permit the exchange of data from recent earthquakes. Full details of the project are on the BGS web site; use the following link (also on the 'Links' page of the CLEAPSS web site): [www.bgs.ac.uk/education/school\\_seismology/home.html](http://www.bgs.ac.uk/education/school_seismology/home.html).

## The D & T Column

### New BS for H&S in D&T

A new edition of the British Standard, *Health and safety for design & technology in schools and similar establishments* is now available - BS 4163:2007. Purchase it from the BSI (020 8996 9001; £30) or the Design & Technology Association (01789 470007; members £20; non-members £25; + £3.50 p&p). This document is an essential part of the health & safety documentation for all design & technology departments. Amongst a lot of new information is the following statement: "The recommended maximum number of students in any one work area is 20 students with one competent, qualified teacher."

### A serious D&T accident in a school

In a school in the North West, a technician cut his hand badly on a circular saw. So that a groove could be cut, the crown guard of the saw had been removed the previous day by a teacher and had not been replaced. The accident happened at the end of the subsequent day, so the guard had been left off for 24 hours. Investigations by the Health and Safety Executive revealed that the technician had not been formally trained to use the machine and the teacher had not had any update on safety training since he had completed his initial teacher training some 25 years previously.

Although it could be argued that it was the staff in the school who were at fault, it was the local authority, as the employer, that was prosecuted by the HSE for "failing to impose, monitor and enforce a uniform safe system of work and minimum levels of training". The fine was £12000, with legal costs awarded to the HSE of £4884.

D & T staff should note that it is an offence in law to use equipment for which they have not been trained and also to misuse equipment provided for health and safety. **Removal of guards could be construed as misuse of equipment.** No operation should be carried out on any machine unless dangerous parts are properly guarded and circular saws should **never** be used without crown guards in place. Whilst it is possible to cut grooves and rebates on a circular saw, using the machine in this way requires special guards over the blade. CLEAPSS would advise D & T staff **not** to cut grooves and rebates on a circular saw *at any time*. We would also advise D & T departments to ensure that all staff are trained and undergo refresher training every 5 years. The Design & Technology Association ([www.data.org.uk](http://www.data.org.uk)) lists consultants able to offer training.

### Spontaneous combustion

Some pupils in a D&T room placed cloths contaminated with linseed oil into a waste-paper bin. During the night, as the linseed oil dried, it oxidised and this exothermic reaction caused the cloths &/or other combustible material in the waste bin to ignite. The smoke produced caused damage to several rooms. Our guidance leaflet PS31, *Disposal of Waste in Design & Technology* does highlight this phenomenon. This document is on the CLEAPSS *Design & Technology CD-ROM* but note that PS31, along with other D&T publications, has been revised or issued since the CD was produced. All updated files, as well as new publications not on the CD at all, can be downloaded from the D&T section of the members-only part of our web site: [www.cleapss.org.uk](http://www.cleapss.org.uk). If you do not have a user name/password to gain access, request them by e-mailing [dtpassword@cleapss.org.uk](mailto:dtpassword@cleapss.org.uk).

**We would be grateful if members of the science department would bring this information to the attention of their D&T colleagues.**

### SIC codes for waste disposal

Some schools have been asked by waste-disposal contractors for their SIC code. The current UK Standard Industrial Classification (SIC) of Economic Activities 2003 lists general secondary education as code 80.21. However, in January 2008 the code will become 85.31. The codes for technical and vocational secondary education are 80.22 and 85.32 respectively; these would apply to most FE colleges and perhaps some sixth-form colleges.

### Exploding peroxide...

A bottle with a small volume of 20 'vol' hydrogen peroxide was left in a fume cupboard after an investigation. The technician added more hydrogen peroxide and then tightened the screw-top cap. By the next morning, the bottle had exploded, showering glass inside the fume cupboard. Presumably, there was something in the solution which catalysed the decomposition of the peroxide. Always prepare diluted samples of hydrogen peroxide in *fresh* bottles rather than top up those that have been in a laboratory and perhaps been contaminated during previous use.

### ...shattering sashes...

Some people appear to believe that the only requirement of a fume-cupboard test is to ensure that the mean face velocity, when measured in 9 positions across the opening, is greater than 0.3 m sec<sup>-1</sup>. However, there are other important parts of a fume cupboard to examine, one of which is the sash window-operating mechanism to determine its condition. Many fume-cupboard sashes operate in a similar manner to household sash windows but use a steel wire, instead of rope, passing over a pulley. With the fumes generated in a fume cupboard, the steel wire may corrode and finally break - with possibly disastrous consequences, for example, as the sash window falls, smashing the glass. In a recent incident with a 15-year old fume cupboard, after the sash wire had broken, teachers held up the sash to allow a technician to remove chemicals and, as the sash was lowered, for some reason the glass shattered violently. Fortunately no one was hurt. The incident was mentioned on a chemistry teachers' discussion group and other schools reported similar occurrences. Is there a pattern emerging? If this has happened in your school, please contact CLEAPSS with details of the fume-cupboard manufacturer and the date of installation.

### ...and a whiteboard wipe out!

Most electronic devices are sensitive to, and may be destroyed by, static electricity discharges. We heard recently of a Van de Graaff generator being operated close to an interactive whiteboard. The board's circuitry was damaged and the whole whiteboard had to be replaced. Teachers should be aware of safety issues regarding the use of electrostatic generators, explained in section 12.9.1 of the CLEAPSS *Laboratory Handbook*. Any apparatus which produces static electricity should be operated at least 2 m away from electronic equipment, including mobile phones (unless they annoy you!). We recommend that those wearing medical electronic equipment should be kept at least 6 m away. Computers and data projectors in the vicinity should be switched off.

### E233 Chemical stocklist

We have had a few calls to the *Helpline* asking about the hazard and storage group codes now included in our chemical stocklist file, E233, on the *Science Publications CD-ROM*. Our apologies for failing to include a key in E233. The codes are exactly the same as those used in Tables 1.1 & 1.2 in section 1.3 of the *Laboratory Handbook* on the CD. Further information on the storage groups is in section 7.3.4 of the *Handbook*.

### The Welsh corner

This is only for our members in Wales! Remember the letter from WAG about the need to gain approval to use animal by-products? The problem has now largely gone away, with most uses no longer requiring authorisation. Details are on the WAG web site; the link to this is too long to print here but go to the 'Links' page of our web site and you will be able to read the new advice to schools.

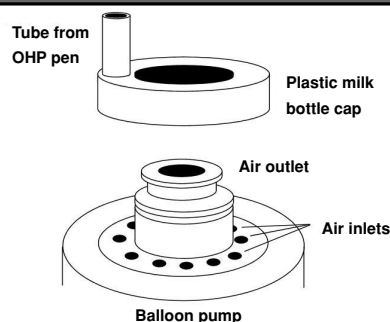
## Tips for Technicians

### There's no smoke...?

One of the consequences of the ban on smoking in public places is the requirement now to use a smoking machine in a fume cupboard. Where schools have filter pumps that fit on a tap, this creates problems if a designated fume cupboard has no water supply. A technician has sent us this tip which uses a modified balloon pump to make a simple suction pump.

A common type of balloon pump has the air intake as a ring of holes around the nozzle. A hollow cap is required to cover the air intakes of the pump and a tube must be fashioned to attach the pump to the 'smoking' apparatus. A plastic milk-bottle cap, together with the tube of an old OHP pen (with the ends cut off), can be used for these. A hole is cut in the bottle cap so that it will fit tightly over the pump nozzle, and another for the OHP pen tube. Fit the bottle cap over the pump nozzle. Push the pen tube into the smaller hole in the milk-bottle cap. Use glue or silicone sealant to make air-tight seals, particularly around the rim of the cap.

This isn't nearly as good as a purpose-made suction pump but it is cheap and exerts enough pressure to suck air through a cigarette, layer of cotton/'Super' mineral wool and a couple of tubes of indicator.



### Viscosity syringes

Prompted by the tip on viscosity investigations in *Bulletin 129*, a technician has told us how he uses 1 ml syringes for the same type of experiment. A small ball bearing is put into the syringe which is then filled with glycerol. The nozzle is blocked (eg, with wax) and the plunger is cut off using heated scissors. The small volume of glycerol allows rapid equilibration when the syringe is moved between water baths at different temperatures and the falling ball and time/temperature graphs show good reproducibility. The glycerol retains clarity even at low temperatures and does not cause the ball bearing to rust.

### Microscope graticules

Earlier this year we were told, erroneously as it turned out, that the Philip Harris micrometer graticule was no longer available. We approached Granet Science ([www.granetscience.com](http://www.granetscience.com); Tel: 01296 398624) to see if the company could source an alternative, which it has now done. (Two strips of 5 graticules; £18; Cat. ref. B405500. There is a charge of £8 for orders less than £50 before VAT.)

The graticules are printed onto a strip of fairly-firm, transparent plastic. The scale is clear, sharply printed and easy to use. Each graticule has three circular cutting guides at 17, 19 and 21 mm diameter to help in cutting the correct size for a particular microscope eyepiece. We found them easy to cut using sharp scissors.

Using a graticule to measure the size of objects being viewed under a microscope is a skill which all A-level biology students should be taught. The modest price of plastic graticules, such as these, means a class set is easily affordable. (They may not last as long as glass graticules but, at around 5% of the cost of a glass version, who is likely to mind?)

### A biology treasure trove

In our *Laboratory Handbook*, we make several references to Don Mackean's collection of practical biology investigations in *Experimental Work in Biology*. These excellent resources are no longer in print but they can be accessed online at the web site: [www.biology-resources.com/biology-experiments2.html](http://www.biology-resources.com/biology-experiments2.html). And there's lots more to explore elsewhere on this site.

### DNA to go!

Schools that have used the Genes in a Bottle kit will be pleased to hear that the National Centre for Biology Education is now selling its own *DNA Pendant Kit* with which students can extract their own DNA and wear it round their necks in a glass vial. Details are at the web site: [www.ncbe.reading.ac.uk](http://www.ncbe.reading.ac.uk). If you are not familiar with NCBE resources, spend some time browsing the site. There you will find DNA electrophoresis investigation kits, a fermenter, excellent enzymes including some from washing powders and a host of publications and practical protocols to buy or download.

## CLEAPSS courses coming soon

Details of our courses, up to half term in February 2008, are listed below. Most sessions are for *technicians*, unless otherwise indicated.

**Basic Skills, General & Chemical:** Essex; Science Learning Centre (SLC) London; SLC Southampton.

**Basic Skills, Physics & Electrical:** Essex; Gloucestershire; Salford; SLC London; SLC Southampton; Surrey.

**Biology Safety:** Gloucestershire.

**Chemical Handling I:** Norfolk; SLC East Midlands; SLC London; SLC Southampton; Suffolk; Surrey.

**Chemical Handling II:** Hounslow; Kent; SLC London; Swansea; Windsor & Maidenhead.

**Electrical Inspection & Testing:** E. Sussex; Herts; SLC Bristol & Keele.

**Fume Cupboard Monitoring:** at CLEAPSS.

**Health & Safety:** Barnet; Essex; Havering; Isle of Wight (middle schools); Norfolk; SLC Bristol; SLC London; SLC Southampton; Warwickshire.

**Health & Safety (NQTs):** Barking & Dagenham; Barnet; Gwynedd.

**Health & Safety Management** (Heads of Science): Essex; Norfolk; SLC Southampton.

**Making Simple Science Equipment:** Birmingham; Derby; Salford; SLC Southampton; Surrey; Warwickshire.

**Microbiology:** Essex; Harrow; Kent; SLC London; SLC Southampton; Shropshire; Swansea.

**Microscale Chemistry** (+ teachers): Kent; SLC Keele; SLC London; SLC Southampton.

**Microscope Maintenance:** Hounslow; SLC Bristol; SLC Southampton.

**Physics Training:** SLC Hertfordshire; SLC London.

**Radiation Protection Supervisors** (Teachers): Enfield; Hampshire; Manchester; Salford; SLC Durham; SLC Keele; SLC Nottingham; SLC Somerset.

**Surely it's banned?** (+ teachers): Kent; SLC Keele.

**For the most up-to-date information on courses being offered, visit our web site;** this indicates the items that participants should bring with them for a particular session. Courses are usually publicised to schools and colleges in the locality of the host establishment but are open to anyone willing to travel. Contact us (ask for Alison or Caroline) for an application form or, for a Local Authority-organised or Science Learning Centre (SLC) course, for details of the contact person. For such courses, you will need to book directly with the Local Authority or SLC. Some Local Authorities give priority to their own schools. **If courses of interest are not being held in your area, please contact us; we may be able to organise something.**